

Work Order ID 136026

Thursday, August 27, 2015 8:48:45 AM

136026

Page 1

Item ID: D350-748-141TRN Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Crosstube Turning Detail
 Start Date: 8/27/2015 Start Qty: 1.00 ***1*** Cust Item ID:
 Required Date: 8/27/2015 Req'd Qty: 1.00 ***1*** Customer:
 Reference:

Approvals: Process Plan: MLS Date: AUG 27 2015 Tooling: _____ Date: _____
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____
 Run Start ***NR1***
 Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D350-748-141	H

100 0.00
100 MORI SEIKI CNC LATHE LARGE
 Mori Seiki Memo 0.02
 Mori Seiki CNC Lathe Large
 1-Fill tube with sand & install plugs on both ends as per Folio FA648
 2-Turn first side as per Folio FA648
 3- File transition files smooth.
 FOLIO REV: AN
 DWG REV: F1

C Ø
 15/10/15

110 0.00
110 QC1- Inspection performed by CMM
 QC Memo 0.00
 Quality Control

1 Ø
 15/10/15

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="width:15%;">Skid-tube ☐</td> <td style="width:15%;">Cross tube ☐</td> <td style="width:15%;">Water Jet ☐</td> <td style="width:15%;">Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐																						
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Date :		Step #:		QTY Effective :			MRB (QSI042) Approval																		
Description Work Order Deviation				Disposition				Completed By																	
								Lead hand / Supervisor Approval Verification																	
								QC / QA Coordinator Approval																	
Root Cause		FAULT CATEGORY																							
Environment ☐	☐ No Re-verification	☐ Pressure/Forced	☐ Temperature/Cure	☐ Power Loss/Surge	☐ Positioned Wrong																				
Design ☐	☐ Operator	☐ Bending	☐ Set-up	☐ Folio/Program	☐ Outside Dimensions																				
Doc/Data ☐	☐ Offset/Setup	☐ Centre Not Concentric	☐ BOM/Route	☐ Grain	☐ Over/Under tolerance																				
Equip/Tooling ☐	☐ Supplier	☐ Cracks	☐ Broken/Damage/Defect	☐ Weld	☐ Part Incorrect																				
Handling/Pre ☐	☐ Training	☐ Crimp/Kink/Ripple/Wave	☐ Inspection Incomplete/Unqualified	☐ Wrong Stock Pulled	☐ Part Lost/Missing																				
Material ☐	☐ Use for Testing	☐ Cuffs	☐ Contamination	☐ Out of Sequence	☐ Part Moved																				
Internal Transport ☐	☐ Poor Information	☐ Crushing	☐ Countersink	☐ Off-set	☐ Drawing																				
Tribal Knowledge ☐	☐ Rushing	☐ Heat Treat	☐ Cut Too Short	☐ Mislabeled	☐ Finish																				
LOA ☐	☐ Product Improvement	☐ Wave/Twist in Tube	☐ Instructions Incomplete/Unclear	☐ Fit/Function	☐ Misread																				
Substation ☐	☐ Process Improvement	☐ Marks/Chatter	☐ Drill Holes	☐ Misaligned/off center	☐ Turning Sequence																				
Past Expiry Date ☐	☐ Manufacturing Process	OTHER :																							
Misidentified ☐	☐ Past Due																								

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Page 2

Item ID: D350-748-141TRN

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 8/27/2015 Start Qty: 1.00 ***1***

Cust Item ID:

Required Date: 8/27/2015 Req'd Qty: 1.00 ***1***

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

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Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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120

120

Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

1-Turn second side as per Folio FA648
2- File transition lines smooth.
3-Scribe Part & Batch as per Dwg D350-748-141
FOLIO REV: AA
DWG REV: A

0.00

0.04

130

130

QC

Quality Control

QC1- Inspection performed by CMM

Memo

0.00

0.00

140

140

QC

Quality Control

QC8- Inspect parts - second check

Memo

0.00

0.00

1 Φ mm
15/10/20

1 Φ mm
15/10/20

1 Φ 15-11-26
NTL

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation			Disposition		
			Completed By		
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Root Cause		FAULT CATEGORY			
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐	No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐	Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐	Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐	Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐	Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐
OTHER : ☐					

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150

150

Crosstubes

Crosstubes

Large Fab

Memo

0.01

1-DRILL HOLES FOR HEAT TREAT USING DT9806(HOLES MUST BE
ALIGNED ON SAME LINE ON BOTH CUFFS)

2-Grind machining marks

W 15-10-26

160

160

Outsource1

Outsource process - Heat Treat

Outsource process - Heat Treat

0.00

Memo

0.20

Issue P/O: **30292**
Heat Treat to min 180 KSI As per Dwg D350-748-141
(MIL-T-6736 OR AMS 2759-1C)

***Check for straighten and ensure parts are straight within 1/8" as per dwg ***

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached and Metlab process spec form

CL OCT 27 2015 1

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

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Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
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Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabelled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐		OTHER : ☐					

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NS1

Revision ID:

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NS2

Item Name: Crosstube Turning Detail

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1

Cust Item ID:

Required Date: 8/27/2015 Req'd Qty: 1.00

1

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QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

NR1

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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170

Receive & Inspect for Damage & Mat'l Certs

0.00

170

Packaging

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

1x SP15-12-07

180

QC6- Inspect dimensions to drawing

0.00

180

QC

Quality Control

Length 112.500 RW 44
Side A Middle Side B
2.245 2.339 2.247
2.246 2.351 2.246

Memo

0.00

190

Packaging

0.00

190

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack
Location: *HAL*

1 **DAS 38 9-80**
DEC 08 2015

15-12-08

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

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Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
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Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabelled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐							
OTHER : ☐									

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136026

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Item ID: D350-748-141TRN

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N900040100

Setup Start

NS1

Revision ID:

Item Name: Crosstube Turning Detail

Stop

NS2

Start Date: 8/27/2015 Start Qty: 1.00

1

Cust Item ID:

Required Date: 8/27/2015 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start

NR1

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop

NR2Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

200

QC21- Final Inspection - Work Order Release

0.00

200

QC

Memo

0.00

Quality Control

MC5 DEC 08 2015*5/20151208*

Picklist Print

Thursday, August 27, 2015 8:48:50 AM

Page 1
1

Work Order ID: 136026

136026

Parent Item: D350-748-141TRN

D350-748-141TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 8/27/2015

Required Date: 8/27/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec
IPP Rev B Removed polish 08.04.02 EC verified by : DD
IPP Rev C Remove LPS-3 08.06.23 EC verified by DD IPP Rev C
11.02.24 as per dwg rev.F DD verf: JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6015-125		Manufactured	No			110	Each	91.0000	1	1			

D6015-125

Crosstube Material

Location

Loc Qty

Loc Code

HALL

91

113255

11

128725

80

1 mmL 15/10/13

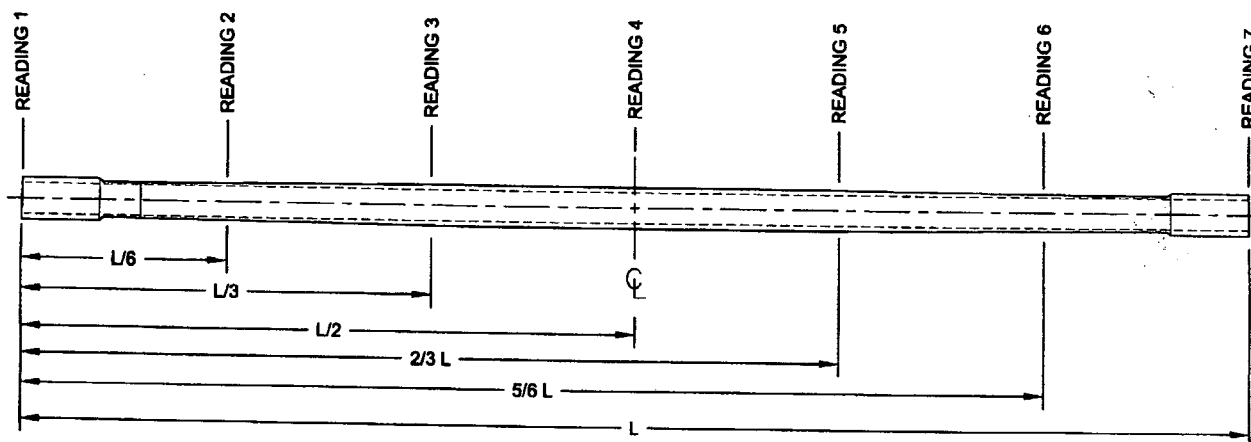
DART AEROSPACE LTD		Work Order:	136026
Description: Crosstube Assembly (AS350/355 High Fwd)		Part Number:	D350-748-141
Inspection Dwg: D350-748-141 Rev: H		Page 1 of 2	

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.244	/		vern	CNC-08
	2.180	+0.005/-0.000	2.184	/			
	2.180	+0.005/-0.000	2.182	/			
	2.237	+0.005/-0.000	2.211	/			
	2.272	+0.005/-0.000	2.275	/			
	2.306	+0.005/-0.000	2.310	/			
	2.339	+0.007/-0.000	2.342	/			
	2.339	+0.007/-0.000	2.342	/			
	0.062	+/-0.010	.062	/		vern	CNC-08
	5.25	+/-0.060	5.26	/		"	
	R0.063	+/-0.010	.063	/		R6	
	R0.50	+/-0.030	.500	/		"	
SIDE B	2.240	+0.005/-0.000	2.243	/		vern	CNC-08
	2.180	+0.005/-0.000	2.184	/			
	2.180	+0.005/-0.000	2.182	/			
	2.237	+0.005/-0.000	2.240	/			
	2.272	+0.005/-0.000	2.275	/			
	2.306	+0.005/-0.000	2.309	/			
	2.339	+0.007/-0.000	2.343	/			
	2.339	+0.007/-0.000	2.342	/			
	0.062	+/-0.010	.062	/		vern	CNC-08
	5.25	+/-0.060	5.26	/		"	
	R0.063	+/-0.010	.063	/		R6	
	R0.50	+/-0.030	.500	/		"	
	112.27	+/-0.060	112.27	/		tape	LG-11

DART AEROSPACE LTD		Work Order: 136026
Description: Crosstube Assembly (AS350/355 High Fwd)		Part Number: D350-748-141
Inspection Dwg: D350-748-141 Rev: H		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.132	.134	.128	.120	.014	0.030"
READING 2 L= 19	.133	.140	.133	.126	.014	
READING 3 L= 37	.172	.177	.189	.171	.017	
READING 4 L= 56	.184	.171	.171	.178	.013	
READING 5 L= 75	.172	.191	.180	.163	.028	
READING 6 L= 93	.131	.108	.143	.159	.051	
READING 7 L= 112	.139	.116	.120	.135	.023	

0.024 Δ 0.016

↑
ORIENT ON
NEUTRAL AXIS

Calibration Result

Actual Block Thickness: .100 .500

Sitescan 250 Measured Thickness: .100 .500

Measured by: mm L
Date: 15/10/20

Audited by: Jte
Date: 15-10-20

Preliminary Approval:
Date:

Rev	Date	Change	Revised by	Approved
C	11.01.20	Dwg Rev updated (P/O D350-748-101)	KJ	
D	11.07.26	Tolerance revised for 2.339 dimensions	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	13.05.08	Dimension 112.27 was 110.27	KJ	
G	14.04.25	5.25 dimension revised to 5.25	KJ	
H	15.04.14	Dwg Rev updated	KJ	

Item	Qty	Part Number	Description
	-141		
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D5123-7	CLAMP CUSHION
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (OR MS21920-21/-22, PER DART SPEC. M-MS21920-20/-21/-22)
8	1	MS27039-1-10	SCREW
9	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH AFTER TURNING = 112.270±0.06 (AFTER BENDING/TRIMMING = 110.27 REF)
- FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-410B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCE: PER DART QSI 018 UNLESS OTHERWISE NOTED.
WALL THICKNESS ECCENTRICITY PER DART QSI 038 7.2
MIN. ALLOWABLE WALL IS -0.020 FROM NOMINAL
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 30.45 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø.297 HOLE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.

TURNING

- BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS2759/1E AFTER TURNING. ACCEPTABLE TO VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.

BENDING

- ALL DIMENSIONS FOR BENT TUBE ARE POST STRESS RELIEF
- BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES PER SIDE. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 8% BASED ON O.D. ON TOP HALF OF BEND, AND 8% ON BOTTOM HALF OF BEND.
- MAX AMPLITUDE OF RYPLING ALONG BENT PORTION OF THE TUBE IS 0.030 (ZN A1-3)
- AFTER BENDING, STRESS RELIEVE TUBE AT 650°F ±1-0.25°F FOR A MINIMUM OF 2 HRS AND ALLOW TO COOL TO AMBIENT TEMPERATURE (REF AMS2759/1E).
- MAX TWIST AFTER STRESS RELIEF: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.38 (ZN C1-3).

ASSEMBLY

- TO INSTALL D3502-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.02" TO 0.05" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.

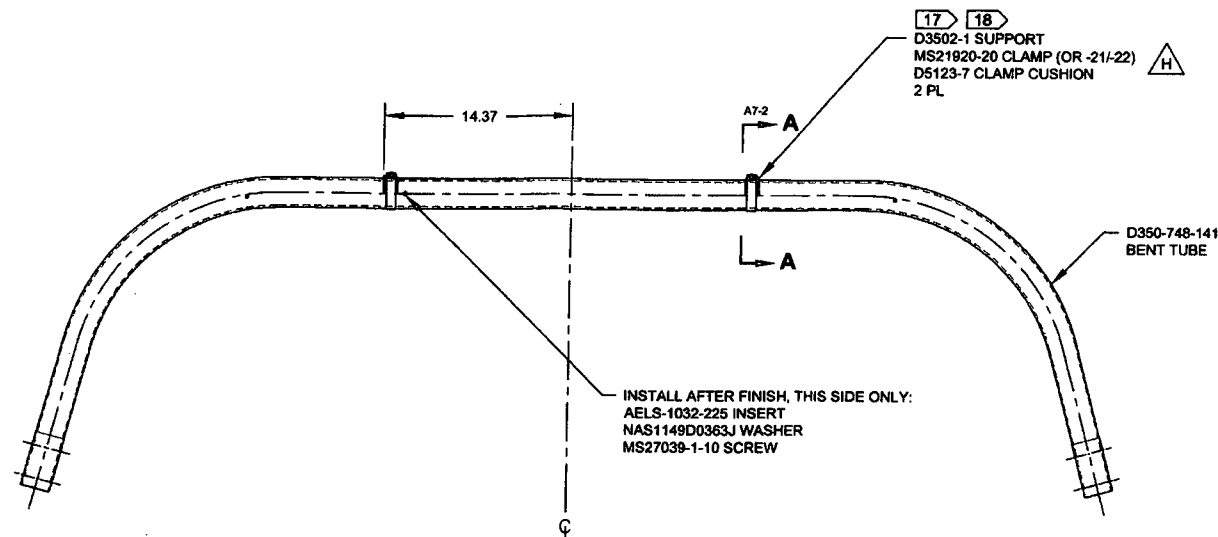
136026 MLJ
15-08-27

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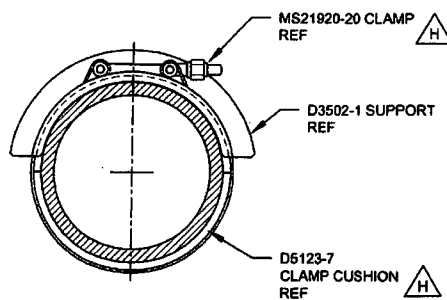
2015 MAR 18

9th EN 15-537

H	D6123-7 WAS D3505-063-395, MS21920-20 WAS -22, ALLOWABLE CRUSHING NOW 8% WAS 7%	CP	15.02.25
G	RMV ABRASION STRIP, SUPPORT NOW W/ PROSEAL & CUSHION, ADD STRESS RELIEF, LONGER CUFF, NOW TRIMD AFTER BEND, ADD WALL DIMS & UPDATE TOL.	CP	12.09.12
F	ADD HRC TEST OPTION (B8-1) PER PAR 08-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C8-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED	ASS		
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	15.02.25		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. D350-748-141 SHEET 1 OF 4 TITLE CROSSTUBE (AS 350/355 HI FWD) SCALE NTS COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			



**D350-748-141
ASSEMBLY DETAIL**

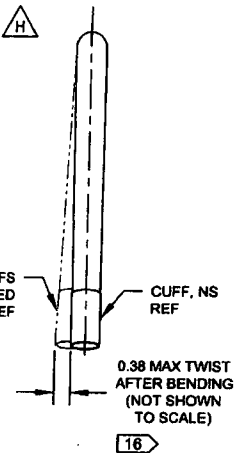
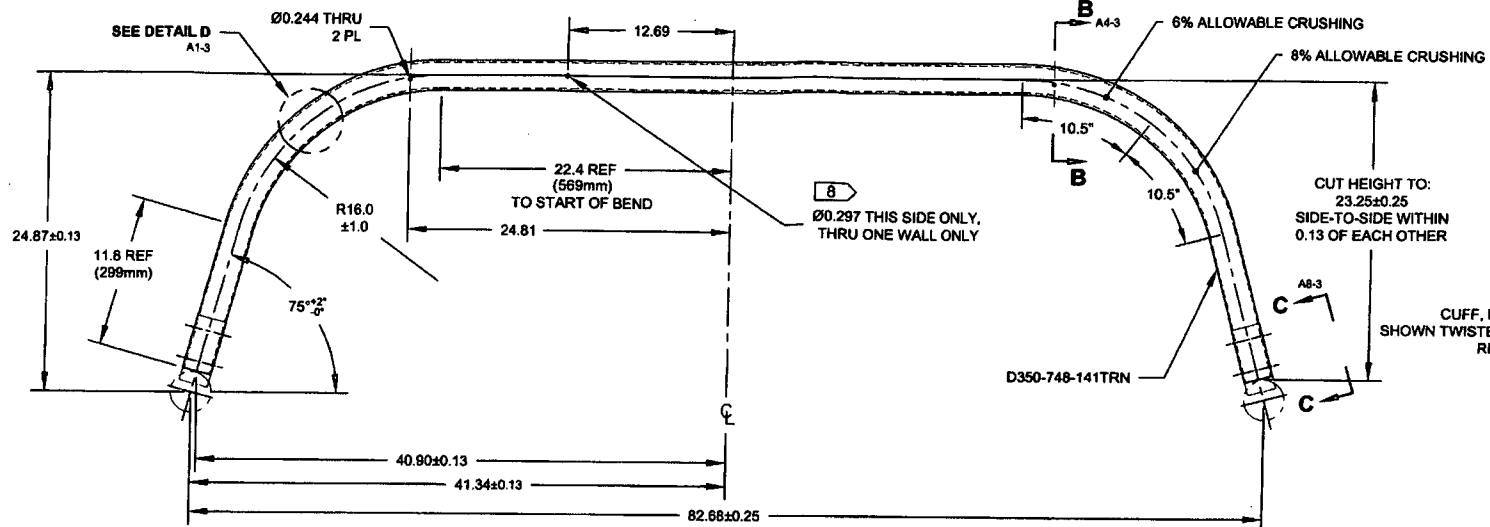


SECTION A-A D4-2
SCALE 6X

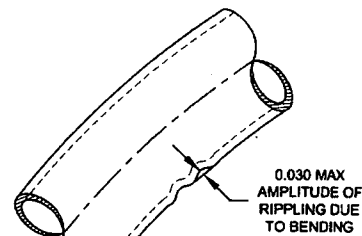
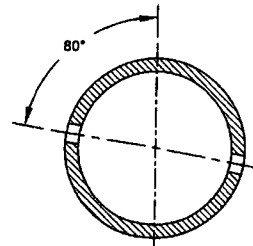
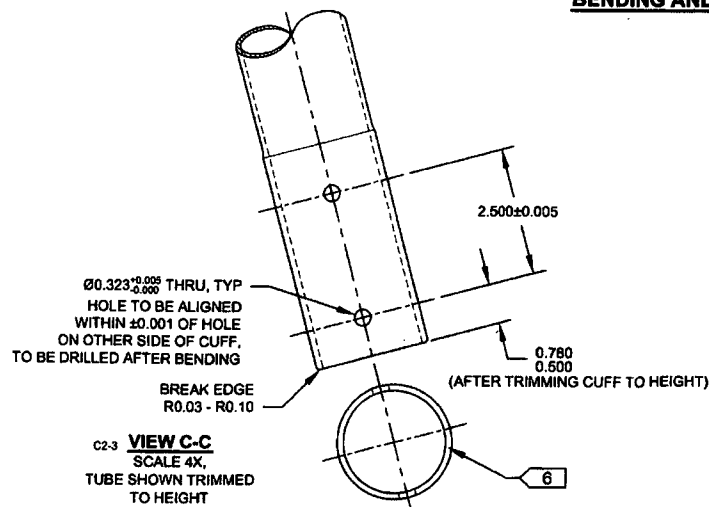
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MFG. APPR.	1	D350-748-141	SHEET 2 OF 4
APPROVED	1	TITLE	SCALE
DE APPR.	1	CROSSTUBE (AS 350/355 HI FWD)	NTS
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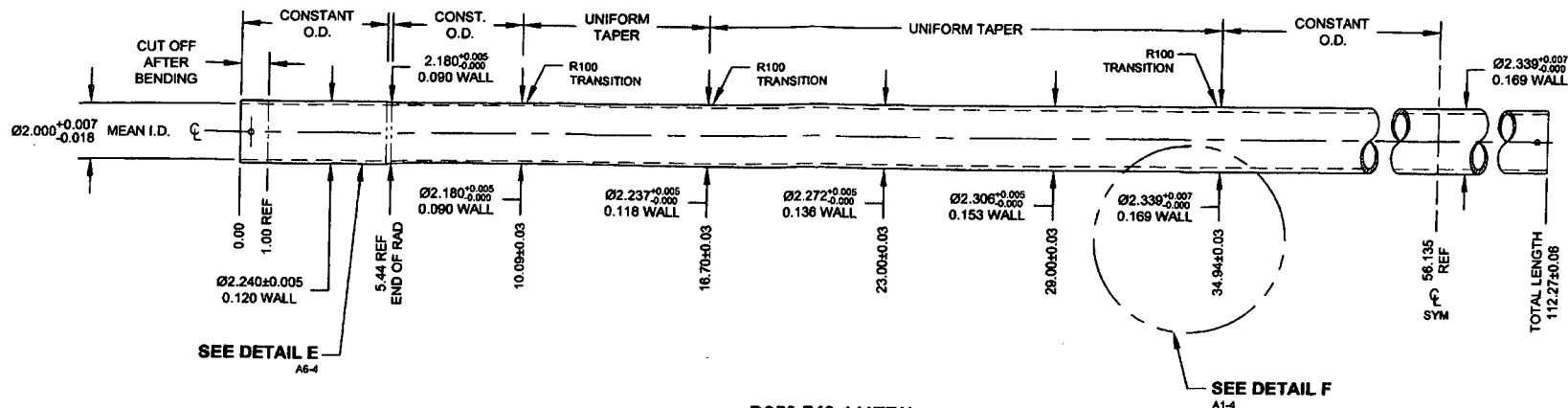


D350-748-141
BENDING AND DRILLING DETAIL 13



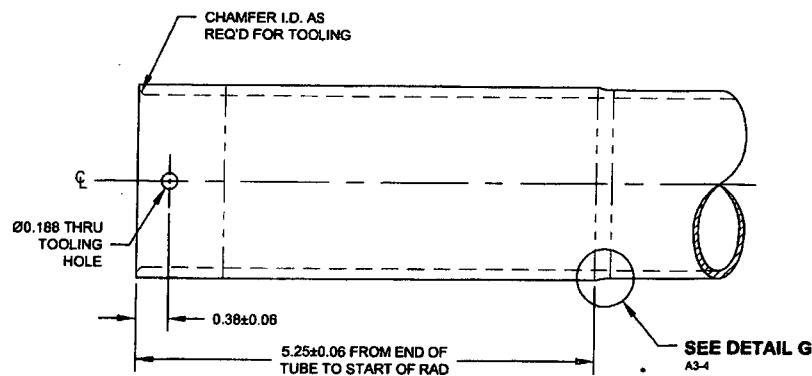
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2015 MAR 18

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CHECKED	ASS	DRAWING NO.	REV. H
MFG. APPR.	ASS	D350-748-141	SHEET 3 OF 4
APPROVED	ASS	TITLE	SCALE
DE APPR.	ASS	CROSSTUBE (AS 350/355 HI FWD)	NTS
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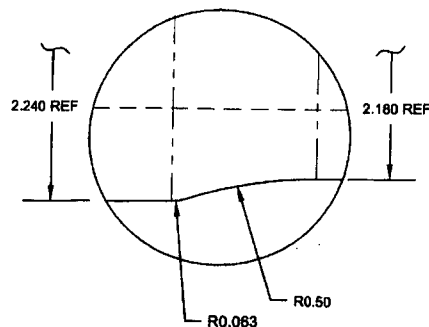


**D350-748-141TRN
TURNING DETAIL**

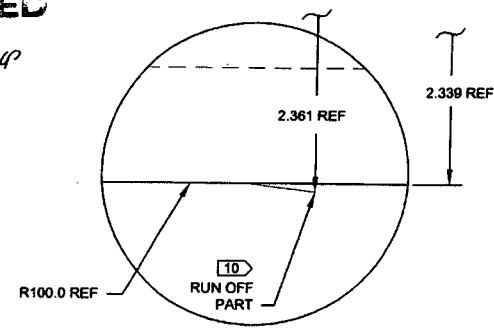
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2015 MAR 18



**DETAIL E:
CROSSTUBE CUFF**
SCALE 3X



**DETAIL G:
CUFF TRANSITION**
NOT TO SCALE



**DETAIL F:
TOOL RUN-OFF**
NOT TO SCALE

DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	ASS	DRAWING NO.	REV. H
MFG. APPR.		D350-748-141	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	15.02.25	COPYRIGHT © 2016 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS UNDERSTANDING THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

DQA:

Date:

16/02/02



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed:

Date:

16/02/02

Work Order update only ☐

Work Order: <u>136026</u> Part No. <u>D350-748-141TRN</u> NCR No. <u>16-5562</u>	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☒ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS <table> <tr> <td>Skid-tube ☐</td> <td>Crosstube ☒</td> <td>Water Jet ☐</td> <td>Engineering ☐</td> </tr> <tr> <td>Machining ☐</td> <td>Small Fab ☐</td> <td>Prod. Eng. Coord. ☐</td> <td>Quality ☐</td> </tr> <tr> <td>Thermoforming ☐</td> <td>Finishing ☐</td> <td>Rec/Store/Packaging ☐</td> <td>Other ☐</td> </tr> <tr> <td>Large Fab ☐</td> <td>Composite ☐</td> <td>Supplier ☐</td> <td></td> </tr> </table>	Skid-tube ☐	Crosstube ☒	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Crosstube ☒	Water Jet ☐	Engineering ☐															
Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐															
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐															
Large Fab ☐	Composite ☐	Supplier ☐																

Root Cause	Date	Step	Qty	Description of work order update or non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Design	15.10.23	140	1	PER FAILURE SHEET ΔW = 0.051 @ READING 6	A.P. 15.10.23	ACTUAL THICKNESS (MEAN) IS 0.124 PER D350-748-141 REV H. ∴ Δ 0.016. ACCEPTABLE	A.P. 15.10.23	TW 15-10-26	ER 15-10-26
Doc/Data									
Equip/Tooling									
Handling/Pre									
Material									
Operator									
Offset/Setup									
Process									
Supplier									
Training									
Transport									
Unapproved									

FAULT CATEGORY

Landing Gear ☐ Bending ☒ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Inspection Strip in Tube ☐ Marks/Chatter ☐ Turning Sequence ☐ Wave/Twist in Tube	General ☐ Bend ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Burrs ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Drawing ☐ Drill Holes ☐ Finish ☐ Fit/Function	☐ Folio/Program ☐ Grain ☐ Hardware ☐ Inspection Incomplete/Unqualified ☐ Instructions Incomplete/Unclear ☐ Misaligned/off center ☐ Mislabeled ☐ Misread ☐ Off-set ☐ Out of Calibration ☐ Out of Sequence	☐ Outside Dimensions ☒ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Positioned Wrong ☐ Power Loss/Surge ☐ Pressure/Forced ☐ Set-up ☐ Temperature/Cure ☐ Weld ☐ Wrong Stock Pulled ☒ Other
---	--	---	--



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID **PO30292**

Purchase Order Date 10/27/2015

PO Print Date 10/27/2015

Page Number 3 of 6

Order From :

VU-MET001

METLAB
1000 E. MERMAID LANE
WYNDMOOR, PA 19038
USA

Ship To : DART AEROSPACE LTD
1270 ABERDEEN
HAWKESBURY, ON K6A 1K7
CANADA

Contact Name

Vendor Phone 215-233-2600

Ship To Contact

Ship To Phone

Ship Via: Journey Freight collect

Ship Acct:

Buyer

Chantal Lavoie

Customer POID

Customer Tax # 10127-2607

Terms

Net 30

Currency

USD

FOB

FCA - (Free Carrier)

136026

D350-748-141TRN
CROSSTUBE

11/18/2015

Yes

11/18/2015

1.00

\$205.00

\$205.00

Sf K p d t

HEAT TREAT TO MIN. 180 KSI
AS PER MIL-T-6736 OR AMS 2759-1C
SAND BLAST TUBE AFTER HEAT TREAT

NOTE: CHECK FOR STRAIGHTEN AND ENSURE PARTS ARE
STRAIGHT WITHIN 1/8" AS PER DWG

Line Total: \$205.00

6 136027

D350-748-141TRN
CROSSTUBE

11/18/2015

Yes

11/18/2015

1.00

\$205.00

\$205.00

HEAT TREAT TO MIN. 180 KSI
AS PER MIL-T-6736 OR AMS 2759-1C
SAND BLAST TUBE AFTER HEAT TREAT

NOTE: CHECK FOR STRAIGHTEN AND ENSURE PARTS ARE
STRAIGHT WITHIN 1/8" AS PER DWG

Line Total: \$205.00

Note:

10/27/2015

METLAB
1000 E. MERMAID LANE
WYNDMOR, PA 19038

Packing List

Sales Order Number:

89796

Sales Order Date

Nov 4, 2015

Page:

1

Voice: 215-233-2600
Fax: 215-233-5653

Sold To:
DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURY, ON K6A 1K7
CANADA

Ship To:
DART AEROSPACE
1270 ABERDEEN STREET
HAWKESBURY, ON K6A 1K7
CANADA

Customer ID	PO Number	Payment Terms
DARA	PO30292	Net 30 Days
Ship Via	Process	
CALL CUSTOMER	HT	

Quantity	Item	Description	Total Shipped	This Shipment
8.00		8 PCS. D350-748-141TRN CROSSTUBE HEAT TREAT TO MIN, 180 KIS PER MIL-T-6736 OR AMS 2759-1C SANDBLAST AFTER HT CHECK STRAIGHTNESS, STRAIGHT WITHIN 1/8" PER DWG 260 POUNDS TOTAL		
1.00	CERT.			

DEC 07 2015

DAS
26
9-89

COMMENTS

SHIPPED BY, SIGNATURE
METLAB

DATE

RECEIVED BY, SIGNATURE
DART AEROSPACE

DATE



1000 E. Mermald La., Wyndmoor (Phila.) PA 19038-8093
Tel. (215) 233-2600 Fax (215) 233-5653

Certification

SOLD TO

Dart Aerospace
1270 Aberdeen Street
Haekesbury, ON K6A 1K7
Canada

November 25, 2015

Metlab Shop Order:	89796
Purchase Order:	PO30292
Description:	D350-748-141TRN-Crosstube
Part No:	B136022, B136023, B136025, B136026, B136027, B136028, B136029
Quantity:	8 Pieces
Weight:	260 Pounds Total
Material:	4130 Alloy Steel
Specifications:	Harden and temper to 180 KSI minimum ultimate tensile strength per AMS 2759-1C

DEC 07 2015
DAS
26
9-89

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.

Results:

Ultimate Tensile Strength: 208/238 KSI*

Surface Hardness: 44/48 HRC

*Approximated from surface hardness

METLAB

Quality Representative

Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.mj



Heat Treating and Metallurgical Consulting